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10/827,418	04/20/2004	Katsumi Mori	2635-213	2583

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EXAMINER	
STIMPERT, PHILIP EARL	
ART UNIT	PAPER NUMBER
3746	
MAIL DATE	DELIVERY MODE
01/21/2009	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/827,418	MORI, KATSUMI	
	Examiner	Art Unit	
	Philip Stimpert	3746	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *02 October 2008*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1,2,4,5,8,9,11-13,15 and 17* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1,2,4,5,8,9,11-13,15 and 17* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *10 August 2006* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

2. Claims 1, 2, 8, 9, and 13-17 are rejected under 35 U.S.C. 103(a) as being unpatentable over Mori (US 2001/0015200) in view of Iwasaki et al (US 5,873,784) and Bouchanveau et al (US 5,850,817).

3. Regarding claim 1, Mori teaches a rotation-to-linear motion transforming apparatus used in a fuel pump, comprising:

a. an eccentric cam (21) coupled to a torque input shaft (70), the cam (21) being rotated through 360 degrees eccentrically with respect to the torque input shaft (70)

b. a cam ring (18) whose inner wall is placed in contact with the eccentric cam (21) such that the cam ring (18) is urged to rotate by the eccentric cam (21), the cam ring having opposed flat surfaces (see Fig. 2) formed on an outer periphery as well as first and second side surfaces extending between the opposed flat surfaces

c. first (top) and second (bottom) plungers (30) placed to be movable linearly cyclically in opposed first and second directions perpendicular (see Fig. 2) to the

axis of eccentric rotation of the eccentric cam (21), the plungers (30) each having a flat surface which is pressed against said cam ring in slidable abutment with the respective flat surface of the cam ring (18) so as to prevent the cam ring from rotating to cause the cam ring (18) to be moved by press arising from the eccentric rotation of the cam from 0 degrees to 180 degrees to complete a linear stroke of the first (top) plunger (30) in the first direction against pressure exerted by the flat surface of the first plunger (30) on the corresponding flat surface of the cam ring (18) and from 180 degrees to 360 degrees to complete a linear stroke of the second plunger (30) in the second direction against pressure exerted by the flat surface of the second plunger (30) on the corresponding flat surface of the cam ring (18).

4. Mori does not teach grooves provided in the side surfaces of the ring (18). Iwasaki et al teach the use of a mechanical safety breaker which fractures along notches when excessive force or torque is applied (col. 8, lines 8-26). Iwasaki et al also teach that the use of a "mechanical safety breaker adapted to operate normally to transmit a force or torque therethrough but to get broken when the magnitude of the force or torque increases beyond a predetermined limit value so as thereby to cease the transmission of the force of torque for the safety purpose is known and used in various mechanical devices" (col. 1, ln. 14-19). Furthermore, Bouchanveau et al teach the use of "a reduced diameter region 28 such that should the fuel pump 10 seize, the reduced diameter region 28 will shear thus restricting damage resulting from the seizure of the fuel pump 10" (col. 1, ln. 58-61). Therefore, it would have been obvious to one of

ordinary skill in the art to modify the cam ring (18) of Mori to provide first and second notches, or grooves, as taught by Iwasaki et al. in the ring so as to cause breakage when the ring is subjected to load greater than a given degree for the purpose of minimizing damage to the structure or apparatus housing the rotation-to-linear motion transforming apparatus. One of ordinary skill would have further found it obvious to place a first groove closer to the second plunger (30) than the first and on a side where it undergoes torque during rotation of the eccentric cam from zero to 180 degrees, and vice versa for a second groove so as to properly react to the forces one of ordinary skill would expect the cam ring (18) of Mori to experience. Furthermore, the grooves as taught by Iwasaki et al. extend from one side to an opposite side. In the combination, that would translate to a groove extending from one end to an axially opposite end across the entire width of the cam ring of Mori.

5. Regarding claim 2, according to the combined references, it would have been obvious to provide the grooves in a portion of the cam ring which is out of abutment with the plungers so as to avoid unnecessary abrasive wear on the plungers from the edges of the notch. Further, it would have been obvious to provide the safeguard in a location where a tensile stress is added when resistance to sliding motion between the cam ring and the plungers increases, since this would have ensured failure in the case of the most likely mode of seizure in the rotation-to-linear motion transforming apparatus of Mori.

6. Regarding claim 8, the groove as taught by Iwasaki et al. is V-shaped in cross-section.

7. Regarding claim 9, the groove as taught by Iwasaki et al. does not communicate through the member in which it is formed.

8. Regarding claim 13, Mori teaches a rotation-to-linear motion transforming apparatus used in a fuel pump, comprising:

a. an eccentric cam (21) coupled to a torque input shaft (70), the cam (21) being rotated through 360 degrees eccentrically with respect to the torque input shaft (70)

b. a cam ring (18) whose inner wall is placed in contact with the eccentric cam (21) such that the cam ring (18) is urged to rotate by the eccentric cam (21), the cam ring having opposed flat surfaces (see Fig. 2) formed on an outer periphery as well as first and second side surfaces extending between the opposed flat surfaces

c. first (top) and second (bottom) plungers (30) placed to be movable linearly cyclically in opposed first and second directions perpendicular (see Fig. 2) to the axis of eccentric rotation of the eccentric cam (21), the plungers (30) each having a flat surface which is pressed against said cam ring in slidable abutment with the respective flat surface of the cam ring (18) so as to prevent the cam ring from rotating to cause the cam ring (18) to be moved by press arising from the eccentric rotation of the cam from 0 degrees to 180 degrees to complete a linear stroke of the first (top) plunger (30) in the first direction against pressure exerted

by the flat surface of the first plunger (30) on the corresponding flat surface of the cam ring (18) and from 180 degrees to 360 degrees to complete a linear stroke of the second plunger (30) in the second direction against pressure exerted by the flat surface of the second plunger (30)on the corresponding flat surface of the cam ring (18).

9. Mori does not teach grooves provided in the side surfaces of the ring (18).However, as discussed above, it would have been obvious to one of ordinary skill in the art to modify the cam ring (18) of Mori to provide first and second notches, or grooves, as taught by Iwasaki et al. in the ring so as to cause breakage when the ring is subjected to load greater than a given degree in a direction of rotation of the cam for the purpose of minimizing damage to the structure or apparatus housing the rotation-to-linear motion transforming apparatus. One of ordinary skill would have further found it obvious to place a first groove closer to the second plunger (30) than the first and on a side where it undergoes torque during rotation of the eccentric cam from zero to 180 degrees, and vice versa for a second groove so as to properly react to the forces one of ordinary skill would expect the cam ring (18) of Mori to experience. Furthermore, the grooves as taught by Iwasaki et al. extend from one side to an opposite side. In the combination, that would translate to a groove extending from one end to an axially opposite end across the entire width of the cam ring of Mori.

10. Regarding claim 15, the grooves as taught by Iwasaki et al. are V-shaped in cross section.

11. Regarding claim 16, the grooves as taught by Iwasaki et al. do not communicate through the member in which they are formed.

12. Regarding claim 17, it would have been obvious to provide the grooves in a portion of the cam ring which is out of abutment with the plungers so as to avoid unnecessary abrasive wear on the plungers from the edges of the notch. Further, it would have been obvious to provide the safeguard in a location where a tensile stress is added when resistance to sliding motion between the cam ring and the plungers increases, since this would have ensured failure in the case of the most likely mode of seizure in the rotation-to-linear motion transforming apparatus of Mori.

13. Claims 4, 5, 11 and 12 are rejected under 35 U.S.C. 103(a) as being unpatentable over Mori in view of Iwasaki et al (US 5,873,784), Bouchanveau et al (US 5,850,817) and applicant's admission of prior art.

14. Regarding claim 4, the previously combined references teach a fuel injection pump (Mori, title) for an engine (Mori, paragraph 3) having a housing (Mori, 11) having formed therein a cam chamber (Mori, see Fig. 1). The previously combined references also teach that the eccentric cam (Mori, 21) is in mechanical connection with a torque input shaft (Mori, 20) into which torque outputted by an engine is inputted, the eccentric cam (Mori, 21) being rotated through 360 degrees eccentrically with respect to the torque input shaft. a cam ring (18) whose inner wall is placed in contact with the eccentric cam (21) such that the cam ring (18) is urged to rotate by the eccentric cam (21), the cam ring having opposed flat surfaces (see Fig. 2) formed on an outer periphery as well as first and second side surfaces extending between the opposed flat

surfaces. Mori further teaches first (top) and second (bottom) plungers (30) placed to be movable linearly cyclically in opposed first and second directions perpendicular (see Fig. 2) to the axis of eccentric rotation of the eccentric cam (21), the plungers (30) each having a flat surface which is pressed against said cam ring in slidable abutment with the respective flat surface of the cam ring (18) so as to prevent the cam ring from rotating to cause the cam ring (18) to be moved by press arising from the eccentric rotation of the cam from 0 degrees to 180 degrees to complete a linear stroke of the first (top) plunger (30) in the first direction against pressure exerted by the flat surface of the first plunger (30) on the corresponding flat surface of the cam ring (18) and from 180 degrees to 360 degrees to complete a linear stroke of the second plunger (30) in the second direction against pressure exerted by the flat surface of the second plunger (30)on the corresponding flat surface of the cam ring (18).

15. Mori does not teach grooves provided in the side surfaces of the ring (18). However, as discussed above, it would have been obvious to one of ordinary skill in the art to modify the cam ring (18) of Mori to provide first and second notches, or grooves, as taught by Iwasaki et al. in the ring so as to cause breakage when the ring is subjected to load greater than a given degree for the purpose of minimizing damage to the structure or apparatus housing the rotation-to-linear motion transforming apparatus. One of ordinary skill would have further found it obvious to place a first groove closer to the second plunger (30) than the first and on a side where it undergoes torque during rotation of the eccentric cam from zero to 180 degrees, and vice versa for a second groove so as to properly react to the forces one of ordinary skill would expect the cam

ring (18) of Mori to experience. Furthermore, the grooves as taught by Iwasaki et al. extend from one side to an opposite side. In the combination, that would translate to a groove extending from one end to an axially opposite end across the entire width of the cam ring of Mori.

16. Regarding claim 5, according to the combined references, it would have been obvious to provide the grooves in a portion of the cam ring which is out of abutment with the plunger so as to avoid unnecessary abrasive wear on the plungers from the edges of the notch. Further, it would have been obvious to provide the grooves in a location where a tensile stress is added when resistance to sliding motion between the cam ring and the plungers increases, since this would have been the most likely mode of seizure in the injection fuel pump of Mori, as indicated by Beauchanveau et al.

17. Regarding claim 11, the grooves as taught by Iwasaki are V-shaped in cross-section.

18. Regarding claim 12, the grooves as taught by Iwasaki do not communicate through the member in which it is formed.

Response to Arguments

19. Applicant's arguments, see page 8, filed 2 October 2008, with respect to indefiniteness have been fully considered and are persuasive. The rejection of claims 1, 2, 4, 5, 8, 9, 11-13, and 15-17 under 35 U.S.C. 112 has been withdrawn.

20. Applicant's remaining arguments have been fully considered but they are not persuasive.

21. With respect to the argument that Iwasaki et al. teach only a safety mechanism between two locked components, the examiner disagrees. The examiner submits that one of ordinary skill, being aware through the teachings of Iwasaki et al. and the general knowledge in the art of frangible safety devices in mechanical linkages, is capable of applying those teachings to a different system in an appropriate way. In particular, the provision of the safety device in the cam is viewed as obvious in view of the combination for reasons which would be apparent to one of ordinary skill in the art, such as simplified manufacture and installation of a replacement after a failure event.

22. With respect to the argument that Iwasaki et al. and Mori are completely different, the examiner also disagrees. Iwasaki et al. and Mori both teach mechanical linkages in automotive applications, and it is submitted that one of ordinary skill would find it obvious, for instance, to transfer teachings from one linkage in an automobile to another.

Conclusion

23. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of

the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Philip Stimpert whose telephone number is (571)270-1890. The examiner can normally be reached on Mon-Fri 7:30AM-4:00PM, EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Devon Kramer can be reached on (571) 272-7118. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Devon C Kramer/
Supervisory Patent Examiner, Art Unit 3746

/P. S./
Examiner, Art Unit 3746
16 January 2009